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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/091,592 | 03/07/2002 | Yuichiro Murata | 1-266 | 7656 |

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EXAMINER

KINDER, DARRELL D

ART UNIT PAPER NUMBER

2862

DATE MAILED: 06/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/091,592

Applicant(s)

MURATA ET AL.

Examiner

Darrell Kinder

Art Unit

2862

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 April 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) 6-8 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Invention I (claims 1-5 drawn to a magnetic sensor) in Paper No. 8 is acknowledged.

Claim Objections

2. Claim 5 is objected to because of the following informalities: line 1 it does not clearly indicate the dependency of claim 5. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
3. Claims 1-2 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's own admitted prior art (prior art) in view of U.S. Patent no. 6,177,731 (Ishida).

Regarding claim 1 the prior art discloses a magnetic sensor comprising: a substrate, which has at least one insulating main surface; at least two serially connected magnetoresistive devices (**Fig. 1B** R1, R2), formed on the insulating main surface page 1 of applicant's disclosure line 20 – page 2 line 3), each of which includes at least one magnetic tunnel junction device (page 1 of applicant's disclosure lines 16-18); a magnetic shield layer, which is formed to cover one magnetoresistive device through the insulating film (**Fig. 1B** page 1 lines 18-19)

The prior art does not disclose that an organic film is used for relieving thermal stress and formed to cover one of the magnetoresistive devices through an insulating film for passivation.

Ishida discloses an IC package, and method of manufacture, wherein an organic film is used for relieving thermal stress (col. 3 lines. 7-12). Ishida teaches that the organic film can relieve thermal stresses (col. 7 lines 32-36), and enhance the reliability of a semiconductor package (col. 7 lines 57-67).

One of ordinary skill in the art would have looked to Ishida to modify the prior art, as they are both analogous in the production and formation of a semiconductor package, the magnetic sensor being formed and produced using traditional semiconductor manufacturing techniques. Furthermore, one of ordinary skill in the art would have been motivated to modify the prior art with the teachings of Ishida, and applied an organic film for relieving thermal stress, over the magnetoresistive device as it would prevent cracking of the MR device, as the magnetoresistive device can be

expensive thus it is desirable to protect, and enhance the reliability of the sensor package.

4. Referring to claim 2, the prior art does not disclose that the shield (**Fig. 1B 42**) has an organic film formed on it. However, Ishida discloses that an organic film is useful for relieving thermal stress, avoiding cracks, and enhancing the reliability of a semiconductor package (col. 7 lines 32-41).

In order to further insure the protection of the MR device, one of ordinary skill in the art would have been motivated to not only place an organic film over the MR device to relieve thermal stress, but to also place the film over the shield layer, as the shield layer may be likely to crack under thermal stress, which can lead to the damaging of the MR device. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to have also included an organic film formed to cover the shield layer to protect the shield from thermal stresses, and to further protect the MR device, reducing costs from cracked MR devices and shields and enhancing sensor reliability (See *In re Zurko*, 258 F.3d 1379, 1385, 59 USPQ 2d 1693, 1697; *In re Ahlert*, 424 F.2d at 1092, 165 USPQ at 421 for obviousness rejections without additional evidentiary documentation support).

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art in view of U.S. Patent no. 6,315,875 (Sasaki).

Regarding claim 3, the prior art discloses a magnetic sensor comprising: a substrate which has at least one insulating main surface; at least two serially connected magnetoresistive devices (**Fig. 1B R1, R2**), formed on the insulating main surface page

1 of applicant's disclosure line 20 – page 2 line 3), each of which includes at least one magnetic tunnel junction device (page 1 of applicant's disclosure lines 16-18); a magnetic shield layer, which is formed to cover one magnetoresistive device through the insulating film (**Fig. 1B** page 1 lines 18-19)

The prior art does not explicitly disclose that the shield layer is made from a nickel-iron alloy having a nickel content of 69% or less. However it is well known in the art of magnetoresistive devices to use a shielding layer of a nickel-iron alloy.

Furthermore, Sasaki discloses a method of making a magnetoresistive wherein a shielding layer of 45% nickel, which is less than 69% (col. 9 lines 41-43). Sasaki uses this material as it has a high saturation flux density allowing proper shielding of magnetoresistive elements (col. 9 line 45).

One of ordinary skill in the art would have been motivated to look to Sasaki to modify the prior art, as it is also concerned with the manufacture of a semiconductor type, specifically a magnetoresistive device. Furthermore one of ordinary skill in the art would have been motivated to use a shield layer containing less than 69% of nickel in a nickel-iron alloy, as it allows proper shielding of the magnetoresistive device, has a high saturation flux density, and further could be cost effective by using a shielding means with a comparative amount of nickel and iron.

6. Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art in view of Sasaki as applied to claim 3 above, and further in view of Ishida.

Referring to claim 4, the proposed combination of the prior art and Sasaki does not disclose a sensor wherein the magnetic shield layer is formed on the insulating film through an organic film for relieving thermal stress.

As above, Ishida discloses an IC package, and method of manufacture, wherein an organic film is used for relieving thermal stress (col. 3 lines. 7-12). Ishida teaches that the organic film can relieve thermal stresses (col. 7 lines 32-36), and enhance the reliability of a semiconductor package (col. 7 lines 57-67).

One of ordinary skill in the art would have looked to Ishida to modify the prior art and Sasaki as they all are in the production and formation of a semiconductor package, the magnetic sensor being formed and produced using traditional semiconductor manufacturing techniques. Furthermore, one of ordinary skill in the art would have been motivated to modify the prior art with the teachings of Ishida, and applied an organic film for relieving thermal stress, over the magnetoresistive device as it would prevent cracking of the MR device, as the magnetoresistive device can be expensive thus it is desirable to protect, and enhance the reliability of the IC sensor package.

7. Referring to claim 5, while the proposed combination does not disclose that the shield has no undercut, it is well known in the semiconductor/magnetoresistive manufacturing art to not include an undercut along the side walls of a shield layer. One of ordinary skill in the art would have been motivated to have no undercut along the side walls of the shielding layer as this allows a uniform shielding over the entire area of the shielding layer, resulting in a shield layer which more effectively shields the magnetoresistive/semiconductor package (See *In re Zurko*, 258 F.3d 1379, 1385, 59

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USPQ 2d 1693, 1697; *In re Ahlert*, 424 F.2d at 1092, 165 USPQ at 421 for obviousness rejections without evidentiary documentation support).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Wada et al. U.S. Patent no. 4,943,882; Fujii U.S. Patent no. 5,442,223; Suzuki et al. U.S. Patent no. 5,471,084; Ao et al. U.S. Patent no. 5,618,738; Okamoto U.S. Patent no. 6,329,087; Tadakoro et al. U.S. Patent no. 6,424,508; Komuro et al. U.S. Patent no. 6,504,690; Muto Japanese Patent Publication 10209521 A.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Darrell Kinder whose telephone number is (703) 305-3303. The examiner can normally be reached on Monday-Friday 6:30-4:00, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, N. Le can be reached on (703) 308-0750. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



N. Le
Supervisory Patent Examiner
Technology Center 2800

dk 
May 28, 2003